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ABSTRACTS
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On the Kephalin of Yolk. (pp. 159∼166): By Uzo NISHIMOTO.

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On the Mechanism of Fermentation of Arabinose by Aspergillus Oryzae. (pp. 167∼173): By Tetsutaro TADOKORO.

Darstellung des Harnstoffes aus Kohlensäure und Ammoniak (III. Mitteilung). (S. 174∼189): Matsuo TOKUOKA. (Taihoku Universität, Taihoku, Taiwan.)

II. Kapital.

§ 5. Die thermodynamische Betrachtung der bei der Harnstoffbildung entstehenden Reaktion.

A) Das Gleichgewicht und das Gleichgewichtskonstant.

Die Reaktion der Harnstoffbildung aus Ammoniumcarbamat ist revirsibel, deshalb muss das Gleichgewicht auch aus Harnstoff und Wasser erreicht werden, und tatsächlich wurde es verwirklicht. Der Mittelwert der Harnstoffmenge, der als die Umsetzung in Prozentansatz von Ammoniumcarbamat in Harnstoff angegeben wurde, ist folgendes:

t °C	130	135	140	145	150	155	160
%	40.71	41.62	42.63	43.65	44.78	46.33	47.85

Bei den Bedingungen, unter denen man die Versuche ausgeführt hat, befinden sich in dem Systeme nur Gasphase und homogene flüssige Phase, von denen der erstere bei grösser Füllung übersehbar ist, weil das Volum sehr klein ist. Am Anfang der Reaktion gibt es 1 Mol. von Ammoniumcarbamat. Ist x Mol. derselbeln nach t Stunden in Harnstoff geändert, dann würde das Rest von Ammoniumcarbamat $1-x$ Mol. sein. Das Gleichgewichtskonstant K kann durch die folgende Formel angegeben werden.

$$\frac{x^2}{1-x}=K$$

Das Konstant bei verschiedenen Temperaturen ist in der Tabelle veranschaulicht.

t °C	130	135	140	145	150	155	160
K	0.2795	0.2967	0.3168	0.3381	0.3631	0.3999	0.4391

B) Reaktionswärme bei der Harnstoffbildung.

Durch die Anwendung der Gleichgewichtskonstanten in die Reaktionsisochore ist die Reaktionswärme bei der Harnstoffbildung aus Ammoniumcarbamat berechnet.

$$Qv=\frac{4.575(\log K_2-\log K_1)T_1T_2}{T_2-T_1}=\frac{4.575\times 0.19609\times 433\times 403}{433-403}\ 5{,}218.9 \text{ Kal.}$$

C) Die Messung des Gleichgewichtsdrucks.

Diese Messung wurde mit demselben Apparate wie bei Dissoziationsdruck von Ammoniumcarbamat ausgeführt. Das Resultat ist folgendes:

t °C	130	140	150
Gl.-Druck (Atm)	28.35	40.75	55.95

Aus diesen Zahlen wurde die folgende empirische Formel abgeleitet, die die Beziehung von absoluten Temperaturen und Gleichgewichtsdruck zeigt.

$$\log P=\frac{-11{,}341.3199}{T}-49.2325\log T+157{,}86063$$

§ 6. Der Einfluss der Unverreinigungen auf die Umsetzung von Ammoniumcarbamat in Harnstoff.

Es wurde probiert, ob das Alkohol enthaltende Ammoniumcarbamat aus Brauereiwerke zur Darstellung des Harnstoffes gebraucht werden kann oder nicht. Es wurde experimentell nachgewiesen, dass solches Ammoniumcarbamat auch ohne weiteres als das Material für Harnstoffbildung benutzt werden kann.

§ 7. Harnstoffbildung aus Ammoniumcarbamat bei der Anwesenheit der Katalysatoren.

Diese Versuche wurden bei 150°C und 140°C unter Benutzung von etwa 20 Arten der Metalloxyden ausgeführt. Aluminiumoxyd, Wolframoxyd, Zirconoxyd, Silika, Gips und Eisenpulver haben merkliche Wirkung für die Beschleunigung der Reaktion bei 140°C gezeigt. Bei 150°C aber ist die Wirkung sehr vermindert. Deshalb wurde es schliesslich beschlossen, dass die Anwendung der Katalysatoren bei dieser Reaktion aus dem ekonomischen Standpunkte nicht vorteilhaft ist.

§ 8. Der Einfluss des Wassers auf die Harnstoffbildung aus Ammoniumcarbamat.

A) Bei Gleichgewicht.

Der Einfluss des Wassers wurde bei 150°C mit den Füllungen von 0 5 bzw. 0.9 geprüft. Die Umsetzung ist umgekehrt proportional den Wassermengen, die zum Ammoniumcarbamat hinzugefügt sind.

Tabelle.

Wassermenge in % von Material	Umsetzung in %		Wassermenge in % von Material	Umsetzung in %	
	F : 0.9	F : 0.5		F : 0.9	F : 0.5
0.0	44.88	43.12	8.0	36.47	33.85
1.0	43.81	——	11.0	33.06	30.71
2.0	42.71	40.26	15.0	28.36	——
5.0	39.21	37.51			

B) Bei kurzem Heizdauer.

Diese Versuche wurden bei 150°C, 155°C und 160°C ausgeführt. Nach den Resultaten kann man im allgemeinen sagen, dass die Beimischung des Wassers bis 2% keine Nachteil verursacht, sondern es vielmehr die Reaktionsgeschwindigkeit beschleunigt.

III. Kapitel. Darstellung des Harnstoffes aus Ammoniumbikarbonat.

Das Verhältnis von $NH_3 : CO_2$ in Ammoniumbikarbonat ist 1, während dasselbe bei Ammoniumcarbamat ist 2, wodurch ist das Erstere schon ungünstig als der Material zur Harnstoffdarstellung. Der Schmelzpunkt von Ammoniumbikarbonat aber ist viel niedriger als der von Ammoniumcarbamat, daher hat man die grössere Reaktionsgeschwindigkeit bei Ammoniumbikarbonat erwartet. Es war aber vergeblich. Das Resultat ist in der folgender Tabelle gesammelt.

(Füllung = 0.9)

t °C	Heizdauer (St.)	Umsetzung %	t °C	Heizdauer (St.)	Umsetzung %
150	1	13.36	155	4	16.47
150	2	14.45	155	6	16.49
150	6	15.53	160	1	14.93
150	10	15.86	160	2	16.56
150	20	15.89	160	3	16.90
155	1	14.18	160	4	16.92
155	2	15.63			

Ergebnisse :—

Als die wichtige Bedingungen für die Harnstoffdarstellung aus Ammoniumcarbamat oder direkt aus Kohlensäure und Ammoniak wurden die folgende vorgeschlagen.

(1) Die Temperatur des Heizraumes muss unbedingt höher als der Schmelzpunkt von Ammoniumcarbamat behalten werden, aber nicht höher als 190°C, von der ab die Niedrigung der Umsetzung erscheint.

(2) Die Füllung ist je grösser, desto günstiger.

(3) Die Heizung des Heizraumes muss homogen wie möglich gemacht werden.

(4) Man braucht keine Katalysatoren, aber die Beimischung des Wassers bis 2% verursacht keine Nachteile, sondern die Reaktion ist dadurch beschleunigt.

Arbeitet man bei oben vorgeschlagenen Bedingungen, dann ist es nicht schwer, innen 30 Minuten eine Umsetzung von über 35% zu erzielen.

Relation of Soil Fertility and Exchangeable Acidity. (pp. 190~193): By Chikafumi ICHIKAWA. (Gifu Agr, College)

I investigated how quantity of exchangeable acidity, and replaceable aluminum and iron, and exchangeable calcium contained in fertile or sick soil.

(1) Fertile soil is generally lower exchangeable acidity than sick soil.

(2) Fertile soil contains comparatively small replaceable aluminum and iron, on the contrary much exchangeable calcium, sick soil contains small exchangeable calcium, on the contrary much aluminum and iron.

(3) When I compare Japanese soil with Manchurian soil which contains soil acidity, and replaceable aluminum and calcium, Japanese soil much acidity and replaceable aluminum, but rather small calcium.

A Method for Quantitative Determination of Triptophan. (pp. 194~198): By Tetsuo TOMIYAMA and Shinobu SHIGEMATSU. (Agr. chem. Laboratory, Imp. University of Kyushu, Fukuoka.)

Food Chemical Studies of Oats. V.—On the oils of Oats produced in Hokkaido. (pp. 199~205): By Eiji TAKAHASHI, Shun-ichi TASE and Yûji SAEKI.

Chemical investigation was made upon the oils of two varieties of oats, that is Kusa oats, a common degenerated variety and White Bergium No. 1, a improved variety, both produced in Hokkaido.

No conspicuous differences were found in composition of their oils but much lower fatty acids were contained in them compared with that produced in other countries. The lower fatty acid was contained in White Bergium No. 1 as much double amount as another variety. The fatty acids were composed of following ratio.

	Lower fatty acids	Palmitic acid	Oleic acid	Linoleic acid
Kusa oats	ca. 3	9.45	51.43−55.69	15.44−19.70
White Bergium No 1.	ca. 6	9.99	49.02−52.46	15.06−18.50

As shown above, large portion of the oil is composed of oleic and linoleic acids, the former predominating much in quantity. The most part of the saturated acids is composed of palmitic acid and contained some other lower volatile fatty acids. The existence of β-linoleic acid as it has been reported by Amberger and Wheeler-Hill was not recognized in our investigation.

On the Amount of Solar Ultra Violet Rays. (Part IV.)—Special relation between the variations of solar ultra violet rays and the weather types. (pp. 206~215): By Torataro HANZAWA. (Chemical laboratory, Fishery College, Hokkaido Imperial University, Sapporo, Japan.)

The intensity of ultra violet ray reaching the surface of the earth was determined by the molybdic method which was deviced formerly by the author.

The constant value which means the total amount of ultra violet rays reached the outer atmosphere at the time if ideal altitude 90° of the sun was computed by means of least square method using the numerical values obtained by the actual measurements. When expressed in quantity as hydrogen for the unit area of per square centimeter per minute, the constant value is 1.2980×10^{-7}.

The following empirical formula was introduced from the above constant and the results of deteminations of ultra violet rays.

$$\log m = \log K - a \operatorname{cosec} \theta + \log \sin \theta - 2 \log r$$

Where, m is the theoretical value of ultra violet intensity, K is the constant, a is a extinction coefficient, r is a distance ratio from the sun to the earth, and θ is a solar altitude whose value can be calculated from the ordinary equation or by Yonemura's method.

By the application of the formula the theoretical value of the intensity at any time and day may be easily calculated. When the theoretical values thus obtained are compared to the results determined by the molybdic method, they are found closely agreed together in a certain limit with a small variations.

After a set of actual measurements and calculations by means of the formula, the author could found that there are special relations between the annual and diurnal variations of the amounts of solar ultra violet rays and the weather types.

The extinction coefficients found on several days in the year 1932 were comparatively small, but rather larger at the period of the noon than the morning. In the year 1933, on the contrary, it appeared much larger in general, and smaller at the noon than that of the morning.

Now the author proposes a hypothesis that if the annual and diurnal variations of the ultra violet rays of the sun are appeared as in the year 1932 it would be introduced the weather type producing the poor harvests of some kinds of agricultural crops, when the variations are as in the year 1933 the weather type might be expected for good climatic conditions on plant growth such as rice plants,

This hypothesis, of course, contains many uncertainties and it should be ascertained by the experimental observations of plant cultures and the actual determinations of the solar ultra violet rays in the day of absolute cloudlessness in future. He asserts the importance of studying on the amounts of ultra violet rays and of observations for meteological factors of the upper atmosphere in the northern part of Japan for the purpose of establishing the scientific foundations of agricultural and fishery practices.

Studies on the Castor-Bean Lipase. VIII.—On the existence of a new substance in castor-seeds which has an ability of activation or retardation on the ricinuslipase corresponding to changing its form by oxidation. (pp. 216~221): By Etsuó TAKAMIYA. (Biochemical Laboratory, Department of Agriculture, Kyushu Imperial University, Fukuoka, Japan.)

Author's discovery of the existence of such a new substance in castor-seeds that has an ability of activation or retardation on the ricinus–lipase corresponding to changing its form by oxidation is very interest not only from point of view on enzymology provided that no activator on a ricinus-lipase is hitherto known, but also perhaps in correlation to the oxidation-reduction system as cysteine and glutathione do in biochemistry, although the mechanism of the new substance on the ricinus-lipase is yet unknown and must be studied in future. All the operations for separating the new substance with a use of purified CO_2 gas must be carefully carried out by protection from oxidation of air as it is sensitive to oxidation.

Castor-seeds (130 grs) are crushed and after addition of N-H_2SO_4(18 cc), kneaded for two hours at 25°C and extracted with ether (Merck) (600 cc) for one hour in a glass-stoppered flask filled with purified CO_2 gas. To the somewhat turbid ether extract obtained by centrifuging, a same volume of petroleum ether (Merck) is added and this ether-petroleumether solution is placed in a bottle sealed with a stopper, and at least over-night in an ice-box. After an upper clear solution separated has been sucked out, the precipitate obtained by centrifuging the residual solution is twice extracted with ether. To this ether extract (y says), a same volume of petroleum-ether is added, and the ether-petroleumether solution is placed at least over-night in an ice-box and the precipitate obtained by centrifuging the ether-petroleum ether solution is called as A. S.

An olive oil solution with the highest active ricinus-lipase (L says) is used as a lipase preparation. In the following table, *a* is an olive oil solution of A. S. that is macerated with the oil immediately after separation by centrifuging the A. S. solution and washing with petroleum ether twice by centrifuging, *b* is an olive oil solution of A. S. that is expelled the solvent from wet A. S. obtained by centrifuging through stirring with a glass-rod in air and dried in vacuum over H_2SO_4, *c* is an olive oil solution of A. S. that is dried in vacuum over H_2SO_4 for 40 days leaving it intact in a centrifuging tube, and *d* is an olive oil solution of A. S. that is dried in vacuum over H_2SO_4 for 3 days after that A. S. in ether-petroleum ether solution has been stirred with a small amount of H_2O_2 and centrifuged.

Lipase preparation	Substance added	Degree of hydrolysis (%)	Lipase preparation	Substance added	Degree of hydrolysis (%)
L	0	24.5	L	*b* (4.0 mg)	12.9
〃	*a* (1.5 mg)	27.4	L	0	9.8
〃	*a* (4.5 〃)	30.2	〃	*c* (8.8 〃)	10 0
〃	*a* (9.0 〃)	33.3	L	0	41.4
O	*a* (9.0 〃)	0.0	〃	*d* (8.0 〃)	19.3
L	0	14.8			

A. S. consists of a mixture of a large amount of crystals of dihydroxystearic acid and of a very small amount of viscous matter. From the fact that precipitate (mainly dioxystearic acid) obtained by centrifuging immediately after addition of petroleum ether to the y solution has no ability of activation, a separation of active substance from dioxystearic acid was succeeded.

From the clear ether-petroleum ether solution from which dioxystearic acid was removed by centrifuging immediately after addition of petroleum ether to the y solution, a very active substance was obtained by evaporation in CO_2 gas in vacuum at room temperature. Thus, it was made clear that a new active substance is soluble both in ether and in petroleum ether.

Methods of separation with a good yield, and the chemical nature of a new active substance, and the mechanism whether it is a simple activator or a maker of good condition for reaction medium should be determined by the further experiments. The new substance when has lost its ability of activation by autoxidation and become indifferent on lipase is not reactivated by the addition of glutathione and the reduction of HCl–Zn.

Studies on the Constituents of Mulberry Leaves especially on their Proteins. VIII.—On the Metabolism of Proteins in Silk-worms when the Qauntity of soluble Carbohydrates Contained in Mulberry Leaves is excessively little. (pp. 222～231): By Yukitaro KISHI.

Studies on the Constituents of Mulberry Leaves especially on their Proteins. IX. (pp. 232～241): By Yukitaro KISHI.

Studies on the Origin of the Kwanto Loam. (pp. 242～249): By Masao HARADA.

Thick deposits of the brown colored soil (so-called Kwanto Loam) are found on the whole of the Kwanto plain (namely, 3～10 meters thickness on the terraces in Kanagawa Prefecture, 1.5～4 meters thickness in Chiba Prefecture, 3～5 meters thickness in Tokyo Prefecture and 2～5 meters thickness in Saitama, Gunma, Tochigi, Ibaraki Prefectures); and no other layers had been considered to exist in this soil, however on the exact observation, many decomposed pumice layers are found. The distribution and the mineral crystals of these pumice soils are as follows;

(1) So-called "Kanuma Soil" is a yellow granular soil and seems to be the last eruptive materials of Mt. Akagi. This pumice-soil distributes on the terraces of the southern parts of Tochigi Prefecture and the middle parts of Ibaraki Prefecture, and is covered with 1～2 meters of Kwanto Loam. By the mineralogical investigation, this soil is consisted of a small

amount of hornblende, hypersthene, magnetite and fairly large amount of feldspar and always mixes a small fragments of various coloured rocks.

(2) "Imaichi Soil" is a deep red coloured one and it can be seen very thick deposits near the surface at the vicinity of Nikko-chō and Imaichi-chō, so that this soil was called "Imaichi Soil" by Prof. K. Kawamura and is found everywhere at the middle parts of Tochigi-plain. This soil layer is always covered with a yellow pumice soil layer, just as Kanuma Soil, and is consisted of many large fragments of igneous rocks and some pieces of hypersthene, augite, feldspar and quartz; however the upper yellow pumice-soil is composed of largely feldspar which is associated with augite, hypersthene, a small amount of hornblende, quartz and fragments of lavas. Both of these soils are the last ejectamenta from Mt. Nantai.

(3) The pumicious dacite-rock, consisted of quartz, feldspar and hornblend, seems to had been erupted from one of peaks of Mt. Haruna (probably Somadaké) and this pumice-soil, which was weathered to the white clayey matter, are found everywhere at the southern foot of Mt. Akagi. At the eastern region of Mt. Akagi, this pumice-soil exist under the layer of Kanuma soil and beneath this pumice-soil, there are many other pumicesoils, which are composed of two-pyroxene-andesite rock and often contain some piece of hornblende. It can be seen also a large amount of not-decomposed pumice, which was erupted from Futatsudaké in Mt. Haruna, at the vicinity of Ikaho-hot-spring and this pumice is also found at the northern foot of Mt. Akagi and on the terraces of Katashina River, one branch stream of Toné River.

(4) Many kinds of decomposed pumices, probably from Mt. Asama, are found at the foot of Mt. Haruna, and from the mineralogical view point, all these pumice-soils are characterized by many large crystals of two-pyroxene and a small amount of feldspar and fragements of andesite rock.

(5) On the southern parts of Kwanto district, so-called "Tokyo pumice-soil", which is the weathering matter of olivine-bearing two-pyroxene andesite, are found on the whole plain of Kanagawa, Tokyo and Chiba Prefectures.

The same composed pumice-soils are found on the southern region of Kanagawa Prefecture, but on the Sayama terrace, where exist Murayama and Yamaguchi reserviors, are also found many sorts of pumice-soil. These latter pumice soils contain a large amount of hornblende and are older than the pumice-soils in the southern parts of Kwanto plain.

These many sorts of pumice-soils have close relationship with the origin of the Kwanto Loam; namely, at a great exprosion, the first eruptive material is always pumice and the next are a great amount of lava and volcanic ash.

On the upper part of the air, such as more than 4,000~5,000 meters height, the wind always blows from the westward, therefore, these eruptive materials always deposit toward the eastern parts of its volcano.

From the mineralogical view point, these Kwanto Loam seem to be roughly classified into the southern and northern kinds: the Loam of the northern parts contains a large amount of feldspar, augite, hypersthene, sometimes small amount of hornblende, olivine and quartz; namely this soil had been weathered from typical andesitic-ash. However the Loam of the upper parts of the southern kind is composed of a little of small sized minerals which are occupied for the most part by the olivine crystals; namely this soil had been weathered from typical basaltic ash, but the Loam of the lower parts alters gradually that of andesitic ash.

From the above description, the origin of the Kwanto Loam may be concluded as follows: the Loam in the northern parts was chiefly erupted from Mt. Asama, Mt. Haruna, Mt. Akagi and Mt. Nantai, but that of the southern parts of Kwanto district seems to had been erupted from Mt. Fuji, Mt. Asitaka, Mt. Hakone and some volcanos which had existed probably in the southern region of Mt. Hakone, but lost their original figures by geological revolutions. At the time when these eruptive materials from these volcanos were falling, the Kwanto plain was changed from the ripping-coast to the land, such as it can be looked on Aluvium plain at the present time and the land seems to had been overflowed by river water, but in the latter half falling of volcanic ashes, on some region, these were deposited completely on land. After these eruptive materials fell over the land, many geological revolutions arose everywhere; for example, the depression of Tokyo Bay and partial risings of Bosō Peninsula, etc. and thus the thick deposit of Kwanto Loam at the present time can be looked on the terraces of Kwanto plain.

I take this opportunity of thanking to Dr. K. Kawamura and Mr. Y. Wada for very helpful suggestions in this investigation.

Correlation Between B_4-Avitaminosis and Composition of Diet. (pp. 250~254): By C. Y. CHEN and H. ARIYAMA. (Bioch. Laboratory, Depart. of Agr., Tokyo Imperial University.)